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OCTAHEDRAL LIMONITE.

BY ERASMUS HAWORTH.

I wish to call attention to a very interesting change now in process in the composition of certain iron pyrites crystals in Dickinson county, Kansas.

In the fall of 1880 I received a number of very perfect octahedral crystals from this county. They were small, their axes varying from one to three-eighths of an inch in length; were of a brown color; and a number of them were hard enough to scratch glass. Remembering that Professor Mudge had reported Spinel from Riley county, I at once concluded these were crystals of the black variety of Spinel, *Pleonaste*, which contains from eight to twenty per cent. of iron oxide. During the winter of 1882, Professor Patrick wrote me that he had examined some of them, and found nothing but iron oxide and traces of water, and suggested the probability of their being altered pyrite. I had no occasion to examine them further until within the last few weeks. On careful examination, it was found that the interior of many of them was unchanged iron pyrites, while the exterior was a hydrated iron oxide.

Through the kindness of Mr. Winnie Sterling, of Midway, Dickinson county, Kansas, I was furnished a much larger assortment of specimens. In this lot I found many crystals which were entirely free from indications of decomposition. Between this and the other extreme, in which there is no trace of sulphur, there is a regular gradation; so there can be no doubt as to the origin of the iron-oxide crystals.

Now the one interesting fact is, that we have here a complete change from the bisulphide of iron — pyrite — to the hydrated oxide of iron — limonite — without altering either the size or form of the crystal. The decomposition of pyrite is an every-day occurrence, familiar to all; but the usual process is to oxidize one-half of the sulphur to the common sulphurous acid gas, while the remaining sulphur, with the iron, is oxidized to ferrous sulphate — *copperas* — which is dissolved by percolating waters. Here, however, we have the whole of the sulphur, removed atom by atom, and its place snugly filled by oxygen and traces of water.

This is the only instance of which I have any knowledge of limonite occurring in octahedral crystals; in fact, it is quite unusual to find it even approaching a crystalline form. It frequently occurs with a smooth botryaidal surface and an internal fibrous structure; but in the case before us, so far as observed, there is no approach to a fibrous structure.

Mr. Sterling writes that he found the specimens near Midway, Dickinson county; that the brown ones — that is the ones partly or wholly decomposed — were found on the surface; that those which were undecomposed were found about two feet below the surface, in a black shale.

PENN COLLEGE, IOWA, November, 1883.

NOTE ON A NEW KANSAS MINERAL.

BY J. T. WILLARD.

Last summer, Mr. J. B. Stevenson, of Garrison, Riley county, sent a mineral to the laboratory of the Agricultural College for identification. It was at first supposed to be hematite, but the black streak obtained on powdering it showed that this surmise was incorrect. A more careful examination proved it to be menaccanite, or titanic iron ore. It occurs in irregular grains of an iron-black color, and submetallic luster. Its fracture is conchoidal, and on the broken surfaces it exhibits a peculiar luster, resembling that of asphaltum. Its hardness is between five and six, but it is quite brittle. Its specific gravity is 4.494. It acts slightly on the astatic needle, but is not attracted by the magnet, even when finely powdered. It does not become magnetic on ignition. Difficultly soluble in hydrochloric acid.

Menaccanite is hematite in which part of the iron has been replaced by titanium. Frequently an additional quantity of the iron is replaced by other elements. The amount of iron thus replaced is by no means constant, and hence we have a number of varieties of this mineral, which can be distinguished only by a chemical analysis. With a view to ascertaining the composition of the subject of our note, the writer made an analysis of it.

About two grams of the mineral, reduced to an impalpable powder, were dissolved by a mixture of strong hydrochloric and hydrofluoric acids. This method of solution is much more rapid than by the tedious process of fusion with potassium bi-sulphate, or other fluxes. After complete decomposition of the ore, the hydrofluoric acid must be entirely expelled by heating with pure sulphuric acid. The solution is then made up to a definite quantity. If the heating has caused a partial precipitation of the titanic oxide, it may be brought into solution by fusion with potassium bi-sulphate. The iron, aluminum and titanium, in one-fifth of the solution, were separated and determined by the familiar methods. From the remaining four-fifths of the solution, all the bases, excepting magnesium, calcium and manganese, were separated by means of sodium acetate. From the concentrated filtrate, the manganese was removed by bromine, and calcium and magnesium determined in the usual manner. The result of the analysis is as follows:

Titanic oxide, TiO_2	47.905	per cent.
Ferrous oxide, FeO	34.755	" "
Magnesium oxide, MgO	9.714	" "
Aluminum oxide, Al_2O_3	6.462	" "
Manganous oxide, MnO	1,897	" "
Calcium oxide, CaO	.084	" "
Total	100.817	per cent.

This composition does not correspond with that of any of the varieties given in Dana's Mineralogy, but seems to be near magnesian menaccanite. Efforts to obtain details in regard to the occurrence of our specimens have thus far been unsuccessful. The mineral is of no commercial value, and is interesting chiefly because of the fact that it contains titanium, one of the rarer elements.

BIRDS NEW TO THE FAUNA OF KANSAS, AND BIRDS RARE IN THE STATE.

Captured at Wallace, Kansas, October 12 to 16, 1883.

BY N. S. GOSS, TOPEKA.

Merula migratoria propinqua Ridgw. Western Robin. Saw a flock of seven; killed two.

Zonotrichia gambeli intermedia Ridgw. Intermediate White-Crowned Sparrow. The birds were quite common along the railway, in the ditches and cuts, which afford both food and shelter from the weeds growing and blown in from the plains. Shot several. Prof. D. E. Lantz writes me that he killed one of the birds at Manhattan, October 9, 1883. The Professor is therefore entitled to the credit of adding the birds to our State list. Its capture so far east is a rare find.

Sphyrapicus varius nuchalis Baird. Red-Naped Woodpecker. Killed a pair out of